REMARKS

Claims 1-20 are all the claims presently pending in the application. Claims 8 and 10 have been amended to more clearly define the invention. Claims 1, 10, 14 and 18 are independent.

These amendments are made only to more particularly point out the invention for the Examiner and not for narrowing the scope of the claims or for any reason related to a statutory requirement for patentability.

Applicant also notes that, notwithstanding any claim amendments herein or later during prosecution, Applicant's intent is to encompass equivalents of all claim elements.

Entry of this §1.116 Amendment is proper. Since the Amendments above narrow the issues for appeal and since such features and their distinctions over the prior art of record were discussed earlier, such amendments do not raise a new issue requiring a further search and/or consideration by the Examiner. As such, entry of this Amendment is believed proper and Applicant earnestly solicits entry. No new matter has been added.

Applicant gratefully acknowledges that claims 2-8 and 16 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, Applicant respectfully submits that all of the claims are allowable.

Claims 1, 9-10, 11-15, and 17-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Awamoto et al. (U.S. Patent No. 6,452,590).

This rejection is respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

The claimed invention is directed to a drive apparatus for a plasma display panel comprising a charge recovery circuit that re-uses a recovered electrical charge. The drive apparatus includes a brightness detection circuit for detecting a brightness so as to obtain screen brightness information, and a charge recovery timing control circuit for controlling a charge recovery period from a time at which a charge recovery operation of the charge recovery circuit starts to a time of fixing to a sustaining potential or a ground potential. The charge recovery timing control circuit controls the charge recovery period of the charge recovery circuit in response to the brightness information obtained by the brightness detection circuit.

A conventional device for charge recovery on an alternating current type plasma display uses an inductive (LC) resonant circuit. If the time constant of the inductive (LC) resonant circuit is made large in order to achieve a sufficient recovery efficiency, the action of electrical charge recovery causes a loss of sharpness in the sustaining pulse applied to the scanning and common electrodes, so that there is a tendency for discharge to start before the drive voltage has risen completely. If discharge occurs midway during electrical charge recover, the discharge current is supplied from the LC resonant circuit rather than the power supply line. Since the energy stored in the conductance of the LC resonant circuit, the power supply capacity is reduced, which increases the voltage drop because of the discharge current. This increase in the voltage drop weakens the discharge and reduces the intensity of the display.

The intensity of the display may be increased by providing a strong discharge.

Further, intensity of the display may also be improved by advancing the timing after

the charge recovery. However, advancing the timing causes a decrease in the charge recovery efficiency and an increase in the variation in intensity which results from a variation in the display load that is established by the number of pixels in each display line.

Moreover, it is preferable to retard the timing after the charge recovery to reduce the variations in the intensity and, thereby, obtain a smooth gray-scale characteristic.

Thus, it has been difficult to balance the conflicting demands of advancing and retarding the timing after the charge recovery.

In contrast to the conventional display drive apparatus, the claimed invention includes a charge recovery timing control circuit that controls the charge recovery period of the charge recovery circuit in response to the brightness information obtained by the brightness detection circuit. In this manner, the present invention is capable of controlling a clamp timing of the sustaining pulse to give priority to gray-scale characteristics when the display intensity is high and controlling a clamp timing of the sustaining pulse to give priority to the peak intensity when the display intensity is low.

II. THE 35 U.S.C. § 112, SECOND PARAGRAPH REJECTION

The Examiner alleges that claim 10 is indefinite. While Applicant submits that such would be clear to one of ordinary skill in the art taking the present Application as a whole, to speed prosecution claim 10 has been amended.

Specifically, Applicant notes that claim 10 has been amended to delete the recitation of "said value."

In view of the foregoing, the Examiner is respectfully requested to withdraw this rejection.

III. THE PRIOR ART REJECTION

Regarding the rejection of claims 1, 9-15 and 17-20 , the Examiner alleges that "it would have been obvious to a person of ordinary skill in the art at the time the invention was made to realize" that the Awamato et al. reference teaches the claimed invention. Applicant submits, however, not only is the "obvious . . . to realize" an improper basis for an obvious rejection, but that there are elements of the claimed invention which are neither taught nor suggested by the Awamato et al. reference.

The Awamato et al. reference does not teach or suggest the features of the present invention including controlling the charge recovery period of the charge recovery circuit in response to brightness information.

As explained above, this feature is important for controlling a clamp timing of the sustaining pulse to give priority to gray-scale characteristics when the display intensity is high and controlling a clamp timing of the sustaining pulse to give priority to the peak intensity when the display intensity is low.

The Awamato et al. reference discloses a drive apparatus for a plasma display panel. In particular, as shown in Fig. 1, the Awamato et al. reference discloses a drive unit 20 which includes a data processing unit 23 in communication with an address driver circuit 29. Field data Df representing an intensity level are supplied to the drive processing unit 23 (col. 7, lines 18-21). The field data Df are stored in a frame memory 231 and are converted into subfield data Dsf (col. 7, lines 23-26). The timing circuit 233 converts the input subfield data Dsf into control data DA which is provided to the address driver circuit 29 (col. 7, lines 31-35).

Further, as shown in Figs. 3A and 3B, the Awamato et al. reference discloses an

address driver circuit 29 which includes a power recycling circuit 33. Fig. 4 shows a more detailed schematic of the driver 32 and the power recycling circuit 33 of the address driver circuit 29. Specifically, Fig. 4 of the Awamato et al. reference shows that the switch driver circuit 49 controls ON and OFF switches 41, 42, 43 and 44 in accordance with the control data DA (col. 9, lines 60-62).

The Awamato et al. reference also explains that the "inductance values of the inductors 51 and 52 should be set so that the necessary time for charging and discharging becomes sufficiently short in the case of the maximum load where the target of charging and discharging is the sum of the interelectrode capacitance Ca." (col. 10, lines 8-14). The Awamato et al. reference further explains that "the inductive values can be out of the range depending on the design giving a high priority to the charging and discharging time or the power recycling ratio.) (col. 10, lines 20-24).

Therefore, contrary to the Examiner's allegation, the Awamato et al. reference does not teach or suggest supplying brightness information to the driving circuits 27 or 28 (which the Examiner analogizes to the inventive charge recovery timing control circuit). Rather, the Awamato et al. reference reference discloses providing the control data DA to the address driver circuit 29 (col. 7, lines 31-35). While the Examiner cites col. 7, lines 23-37, in an attempt to support the allegation that the Awamato et al. reference supplies brightness information to the driving circuit 28, to the contrary col. 7, lines 23-37 (in addition to Fig. 1) shows that the control data DA is provided only to the address driver circuit 29 and not to the driving circuits 27, 28.

Further, contrary to the Examiner's allegations, the Awamato et al. reference does not teach or suggest controlling the charge recovery period, let alone controlling a charge

recovery period based upon brightness information. Rather, as explained above, the Awamato et al. reference explains that the inductance values of the inductors 51 and 52 "should be set so that the necessary time for charging and discharging becomes sufficiently short in the case of the maximum load where a target of charging and discharging is the sum of the interelectrode capacitance Ca. In other words, the Awamato et al. reference teaches building the power recycling circuit by selecting inductors that have inductances which are based upon the design of the interelectrode capacitance Ca. Thus, once the inductances are set (i.e. the inductors are selected) and provided to the power recycling circuit, the inductances do not change. Therefore, the Awamato et al. reference does not teach or suggest controlling the charge recovery period.

While the Examiner cites col. 9, line 66 through col. 10, line 23 of the Awamato et al. reference in an attempt to support the allegation that the Awamato et al. reference discloses controlling the time of recycling, contrary to this allegation, the Awamato et al. reference merely discloses how the power recycling circuit may be designed to have desired characteristics.

Clearly, the power recycling circuit 33a of the Awamato et al. reference is not variable in any manner. Indeed, the Awamato et al. reference teaches that the inductances of the power recycling circuit should be set based upon design considerations. The Awamato et al. reference does not teach a power recycling circuit which has any varying characteristics at all.

The Examiner's logic is akin to alleging that the ability to select between components having specific, non-varying characteristics which are to be included in a device is the same as having a device which includes components having varying characteristics. Clearly, the Examiner's logic is flawed.

The Examiner also admits that the Awamato et al. reference does not teach or suggest controlling the charge recovery period of the charge recovery circuit in response to brightness information. However, the Examiner then contradicts his own statement by alleging that "as shown in Fig. 1, the control data DA that includes the brightness information is supplied to the address driver circuit (29), which includes the recycling circuit. The recycling circuit has a different recovery period. Therefore, to have the correct brightness, the recovering of the charges will depend on the intensity (the brightness) of the display."

Contrary to the Examiner's allegation, as explained above, the recycling circuit of the Awamato et al. reference does not have a different recovery period. Rather, the Awamato et al. reference explains that while the inductors may be selected during the design process of the power recycling circuit, once the power recycling circuit is built, the inductance (and therefore the timing) of the power recycling circuit does not change.

Additionally, the Examiner appears to argue that because the brightness information (control signals DA) are supplied to the address driver circuit 29, that because the address driver circuit 29 includes a power recycling circuit 33, and that the recycling circuit allegedly has a "different" recovery period, that these three statements lead one to necessarily conclude that "the recovering of the charges will depend on the intensity (the brightness) of the display."

The Examiner appears to overlook at least three very important facts which prove that the Examiner's logic is flawed and incorrect.

Firstly, as explained above, the timing of the power recycling circuit disclosed by the Awamato et al. reference does not vary.

Secondly, while the control signals DA may be provided to the address driver circuit

29, as shown in Fig. 4, this is irrelevant as the control signals DA are not provided to the power recycling circuit 33 nor to a charge recovery timing control circuit. Therefore, the power recycling circuit 33 cannot vary timing based upon the control signals DA. Rather, as explained above, Fig. 4 of the Awamato et al. reference shows that the switch driver circuit 49 controls ON and OFF switches 41, 42, 43 and 44 in accordance with the control data DA (col. 9, lines 60-62). Therefore, the Awamato et al. reference does not teach or suggest controlling the timing based upon the control signals DA.

Thirdly, the Awamato et al. reference does not teach or suggest that the switch driver circuit 49 controls the switches 41 - 44 based upon brightness information which may be included in the control signals DA. Indeed, the Awamato et al. reference does not teach or suggest how the switch driver circuit 49 controls the switches based upon the control signals DA at all, let alone any brightness information which may be included in those control signals DA.

Moreover, the Examiner alleges that:

> "[I]t would have been obvious to a person of ordinary skill in the art at the time the invention was made to realize from Awamato's device that the period of the charge recovery will depend on the brightness of the display because, it the brightness of the device is high, the period or recycling (recovering) will increase to accommodate the excess of the charges, and if the brightness of the device is low, the time of recycling will be low. Such relation between the brightness and the recovering of the charge will reduce the power consumption without the degradation of the brightness (intensity) of the display device."

The Examiner makes this allegation without pointing to any portion of the Awamato et al. reference which teaches or suggests any relation at all between the timing of the charge recovery and the brightness of the display. Applicant's respectfully submit that the above language has been lifted directly from Applicant's own specification, rather than from any applied reference. Therefore, the Examiner has engaged in impermissible hindsight.

In the Examiner's Response to Arguments, the Examiner attempts to clarify the allegation that the Awamato et al. reference discloses that the recovering of the charges depend upon the brightness of the display by stating that "[T]his simply means that since the control data, which includes the brightness information, is supplied to the recycling circuit; then such data in turn will affect the recycling circuit." However, as explained above, the Awamato et al. reference does not teach or suggest that the control data DA is supplied to the recycling circuit. To the contrary, the Awamato et al. reference teaches that the control data DA is only supplied to the switch driver circuit 49 which controls ON and OFF switches 41, 42, 43 and 44 in accordance with the control data DA (col. 9, lines 60-62).

Further, the Examiner attempts to explain the Examiner's contradicting statements that the Awamato et al. reference does not disclose that the recovering of the charges depend upon the brightness and that the Awamato et al. reference does disclose that the recovering of the charges depend upon the brightness by positing that "Awamoto's reference does in fact teach the limitation but in the collective sense. In other word (sic), because the brightness is part of the control data; it affects the recycling circuit. Therefore, the obvious (sic) statement provided by the Examiner is to affirm that, Awamato's device teaches the limitation but in the obvious ground and not in the anticipation ground".

Applicants respectfully submit that the Examiner does not present a prima facie case

of obviousness. As set forth in M.P.E.P. § 2142:

> "To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure."

The Examiner has identified that the Awamato et al. reference does not teach or suggest controlling the charge recovery period of the charge recovery circuit in response to brightness information, and fails to present a prima facie case of obviousness by: 1) not providing a prior art reference which teaches controlling the charge recovery period of the charge recovery circuit in response to brightness information; and 2) providing a motivation for modifying the Awamoto et al. reference based upon the missing prior art reference.

Indeed, the Examiner attempts to make the appearance of providing a motivation to modify the Awamato et al. reference by alleging that "it would have been obvious to a person of ordinary skill in the art . . . to realize" that the Awamato et al. reference actually does disclose the feature which the Examiner admits is not disclosed. The Examiner is engaging in double-speak in an attempt to resurrect a failed attempt to provide a prima face case of obviousness.

Therefore, contrary to the allegations of the Examiner, the Awamato et al. reference

does not teach or suggest each and every element of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection of claims 1, 9-15 and 17-20.

IV. FORMAL MATTERS AND CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully submits that claims 1-20, all the claims presently pending in the Application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the Application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that the foregoing Amendment was filed by facsimile with the United States Patent and Trademark Office, Examiner Amr A. Awad, Group Art Unit # 2675 at fax number (703) 872-9315 this 20th day of August, 2003.

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